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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT PAPER NUMBER

1774

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/073,011

Applicant(s)

KAMATANI ET AL.

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/05/03, 11/26/03 and 02/02/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-16 is/are pending in the application.
- 4a) Of the above claim(s) 4-6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7 and 9-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

1. This Office action is in response to applicant's amendment received February 02, 2003, which amends the abstract, the specification, and claims 1-3, and cancels claim 8.

Claims 1-7 and 9-16 are pending.

2. Certified copies of foreign priority documents JP2000-364650 and JP 2001-064203 were received November 26, 2003.

3. The English translation of an International Preliminary Examination Report, submitted with the Information Disclosure Statement received November 05, 2003, has been considered. The cited references were previously considered by the examiner and made of record.

4. The claims remain subject to an election of species requirement. Claims 1-3, 7 and 9-16 continue to read on the elected species although the ultimate species previously selected by applicant as the starting point for search and examination purposes is no longer within the scope of the claims.

5. Claims 4-6 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected species, there being no allowable generic or linking claim. Election was affirmed **without** traverse in the amendment received February 02, 2004. (Claims drawn to nonelected species will be considered upon allowance of a generic or linking claim.)

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6. The objections to the abstract and the disclosure, as set forth in the Office action mailed July 30, 2003, are overcome by applicant's amendment received February 02, 2004.

The issue raised under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, regarding the scope of a "non-luminescent" first compound is rendered moot by the deletion of "non-luminescent".

The issue raised under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, regarding the language "containing no substituent...B" in claim 2 is overcome by applicant's amendment.

The last issue raised under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, in the previous Office action is withdrawn. Since claim 3 recites "present at a prescribed concentration...providing a maximum luminescence characteristic", the compound of formula (1) must be present at the concentration which provides a maximum luminescence characteristic.

The rejection under 35 U.S.C. 102(e) based on Grushin's publication US 2002/0121638 A1 is overcome by applicant's amendment.

The rejections under 35 U.S.C. 102(e) and 35 U.S.C. 103(a) based on Okada's publication US 2002/0055014 A1 are overcome by applicant's amendment.

7. Claims 1-3, 7 and 9-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1 defines required and optional substituents for the phosphorescent second organic compound. The original disclosure requires the phosphorescent second organic compound (the compound represented by formula (1)) to include at least one cyclic group having a substituent. The amended claim language is broader than supported by the original disclosure because the amended claim language does not define the required and optional substituents as substituents on a cyclic group.

The original disclosure does not provide support for the full scope of substituents encompassed by c) and n) as set forth in claim 1.

8. Claims 2 and 11-14 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for devices comprising specific compounds within the scope of formula (1) as defined in present claim 1 that are disclosed in the original disclosure and comprising CBP as the first organic compound wherein the "maximum luminescence characteristic" is one of the characteristics set forth in claims 11-14, does not reasonably provide enablement for devices of present claims 2 and 11-14 utilizing compounds of formula (1) that are not specifically disclosed in the original disclosure and/or utilizing compounds of formula (1) in combination with a first organic compound other than CBP, and wherein the "maximum luminescence characteristic" is a characteristic other than those set forth in claims 11-14. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The examiner presumes, for the sake of argument, that a device with a luminescence layer comprising CBP in combination with at least one of the 15 specifically disclosed compounds that meet the limitation of a compound of formula (1) as defined in present claim 1 will meet the limitations of claim 2 and at least one of claims 11-14.

In order to determine whether a particular device meets the limitations of claim 2 and one or more of claims 11-14, one would have to test devices for various luminescence characteristics utilizing various combinations of first and second compounds and would have to test devices for various luminescence characteristics utilizing various concentrations of compounds of formula (1) which have no substituent in A/A' or B/B'.

Formula (1) as defined in present claim 1 encompasses hundreds, if not thousands, of different compounds. The present specification defines 883 specific compounds of formula (1) as defined in the original disclosure. Only 15 of those 883 compounds meets the limitations of a compound of formula (1) as defined in present claim 1. No working example of a device utilizing any of the 15 compounds meeting the limitations of the compound of formula (1) as required by claim 1, with claims 2 and 11-14 dependent therefrom, is set forth in the specification.

Based on the few device examples in the specification, none of which utilize a compound of formula (1) as defined in present claim 1, it is unknown whether every combination of first and second compounds will meet the limitations of claim 2 for all possible luminescence characteristics or, for that matter, will meet the limitations of claim 2 for each of the four characteristics recited in claims 11-14. No combination of first and second compounds is tested

for all four characteristics, and all device examples utilize CBP as the first compound in combination with a second compound outside the scope of the second compound required by the present claims. It is unknown from the data provided whether different first compounds, and different combinations of first and second compounds, will affect the concentration at which a maximum luminescence characteristic is exhibited.

It is not clear for the few device examples in the specification whether there is any predictability as to what combination of first and second compounds will provide devices meeting the limitations of claim 2 and one or more of claims 11-14. It is also unclear from the specification whether other unlimited device construction details, such as the presence of layers other than the luminescence layer, will affect the concentration at which a particular combination of first and second compounds will exhibit a maximum luminescence characteristic. One of ordinary skill in the art would have to perform undue experimentation to determine the scope of devices encompassed by claims 2 and 11-14.

9. Claims 1-3, 7 and 9-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Formula (3) represents a partial structure  $ML'_n$  but, as shown in present claim 1, includes a subscript "m" instead of --n-- (a subscript "n" was shown in formula (3) in original claim 1).

The scope of possibilities for E, G and J are not clear. E, G and J can broadly be considered to be substituents of the phosphorescent second organic compound. The definition of required substituents selected from a) to c) and optional substituents selected from d) to i) are not consistent with the definition of E and G selected from j) and k) and the definition of J selected from l) to n). For example, substituent a)/g) is outside the scope of j) to n).

The structure of substituents within the scope of c) as set forth in claim 1 is not clear. It is not clear what "via an alkyl group spacer" refers to. It is not clear if the alkyl spacer group connects the aromatic cyclic group having a substituent to the phosphorescent second organic compound, or if the alkyl spacer group connects the "substituent selected from the group consisting of a halogen atom...alkyl group" to the aromatic cyclic group, or if the alkyl spacer group connects the "alkyl group...-C≡C-" to the aromatic cyclic group.

The structure of substituents within the scope of n) as set forth in claim 1 is not clear. It is not clear if "which said alkyl group" refers to the "alkyl group having 1 to 8 carbon atoms" which is part of the trialkylsilyl group or to the "alkyl group having 1 to 20 carbon atoms". It is also not clear what is via the alkyl group spacer.

The metes and bounds of claims 2 and 11-14 are not clear because there are numerous compounds within the scope of a compound represented by formula (1) as defined in claim 1, there are numerous compounds within the scope of a compound represented by formula (1) but containing no substituent in A and A' or in B and B', and there are potentially many compounds within the scope of the first compound which must be used in combination with the compound of formula (1). It is not clear what compounds and/or luminescence layers and/or luminescence



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devices must be compared in order to determine whether the limitations of these claims are met by a particular device.

The metes and bounds of claim 2 are additionally unclear because the scope of a “maximum luminescence characteristic” other than the four luminescence characteristics recited in claims 11-14 is not clear.

The scope of a “maximum luminescence characteristic” as recited in claim 3 is not clear.

Antecedent basis for “the substituent” as recited in claims 9 and 10 is not clear. Claim 1 requires at least one of substituents a) to c), none of which encompass a trifluoromethyl group as recited in claim 9 or an alkyl group *per se* as recited in claim 10. A trifluoromethyl group as required by claim 9 is also not within the scope of optional substituents d) to i) or within the scope of j) to n).

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, 7 and 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grushin et al. (US 2002/0121638 A1).

See the whole patent. In particular, see paragraphs [0002]-[0004], [0008]-[0021], [0038]-[0039], [0048] and [0063]-[0065].

Grushin discloses iridium compounds for use in an organic luminescence device. As taught in paragraph [0065], the compounds may be used in combination with other materials at concentrations of 8 wt% or higher.

Grushin suggests compounds within the scope of a compound of formula (1) as defined in present claim 1 and further defined in claim 7. For example, an alkoxy group having 1-19 carbon atoms meets the limitations of substituent b) as defined in present claim 1 wherein a methylene group is replaced with -O-. In addition to an alkoxy group, the compound of formula (1) as defined in present claim 1 may also have a halogen atom as a substituent. Grushin discloses compounds having a halogen atom as a substituent (specifically, a fluorine atom), and teaches that the compounds may also have an alkoxy substituent (e.g. see paragraph [0039]). Grushin's compounds 1-i, 1-q and 1-r as defined in Table 1 each contain a methoxy group as a substituent. These three prior art compounds differ from the compound of formula (1) as defined in present claim 1 in that the prior art compounds also have a trifluoromethyl group as a substituent whereas none of a) to n) as set forth in claim 1 encompass a trifluoromethyl group (although dependent claim 9 requires a trifluoromethyl group as a substituent).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make compounds suggested by Grushin and similar to the specific compounds disclosed by Grushin with the expectation that compounds similar in structure would have similar properties and could be used for the same purpose. One of ordinary skill in the art at the time of the invention would have reasonably expected that compounds similar to Grushin's compounds 1-i, 1-q and 1-r but having a fluorine atom as a substituent in place of the

trifluoromethyl group would have properties similar to the properties of compounds 1-i, 1-q and 1-r, and could be used for the same purpose.

With respect to claim 9, Grushin discloses compounds having a trifluoromethyl substituent as well as a fluorine substituent, and discloses compounds having a methoxy substituent as well as a fluorine substituent (see Table 1). One of ordinary skill in the art at the time of the invention would have reasonably expected that similar compounds having a combination of trifluoromethyl, fluorine and methoxy substituents would be suitable for Grushin's purposes.

With respect to claim 10, Grushin teaches that the compounds may comprise an alkyl group as a substituent (see paragraph [0039]). One of ordinary skill in the art at the time of the invention would have reasonably expected that compounds having a combination of alkyl, alkoxy and fluorine substituents would be suitable for Grushin's purposes.

With respect to claims 2, 3 and 11-14, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the luminescence characteristics of a device comprising an iridium compound according to Grushin. Grushin teaches that the concentration of the iridium compound may be greater than the concentration at which Ir(ppy)<sub>3</sub> provides a maximum luminescence characteristic.

12. Claims 1-3, 7 and 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi et al. (US 2001/0019782 A1).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Igarashi discloses iridium compounds represented by formula (1) as defined in present claim 1. For example, see formulae (1-6), (1-47) and (1-50) on pages 10 and 15. The iridium compounds are disclosed for use as a light emitting material in an organic luminescence device (e.g. see paragraphs [0002]-[0004]). Igarashi's compounds of formulae (1-6), (1-47) and (1-50) meet the limitations of the compound of present formula (1) wherein the compound has a substituent within the scope of b) as set forth in present claim 1 (the methoxy substituent of these three prior art compounds meets the limitations an alkyl group having 2 carbon atoms in which one methylene group is replaced with -O-). The prior art compounds of formulae (1-6) and (1-50) meet the limitations of a compound of formula (1) as further defined in present claim 7. The prior art compound of formula (1-47) meets the limitations of a compound of formula (1) as further defined in present claim 10, subject to clarification as to what "the substituent" refers to.

Igarashi does not specifically limit the concentration of the iridium compound in the luminescence layer of the device, but Igarashi's examples demonstrate that Igarashi's iridium compounds may be used at concentrations of at least 8 wt% (e.g. the concentration of the iridium compound in the devices of Examples 15, 19 and 20 is 10 wt%; the concentration of the iridium compound in the device of Example 16 is 100 wt%).

While Igarashi does not disclose a specific example of a device having a luminescence layer comprising 8 wt% or greater of a compound represented by formula (1) as defined in

present claim 1, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum concentrations for Igarashi's iridium compounds. One of ordinary skill in the art would have reasonably expected that functional devices could be provided using the various iridium compounds disclosed or suggested by Igarashi at concentrations greater than 8 wt% since Igarashi demonstrates functional devices at concentrations greater than 8wt%.

In addition to the three specific compounds meeting the limitations of a compound of formula (1) as defined in present claim 1, Igarashi suggests other compounds within the scope of compounds represented by present formula (1).

With respect to present claim 9, Igarashi teaches that the cyclic groups of the ligands may be substituted with a trifluoromethyl group (e.g. see formula (1-61) on page 16).

With respect to present claim 10, Igarashi teaches that the cyclic groups of the ligands may be substituted with an alkyl group (e.g. see formulae (1-4) and (1-5) on page 10).

Regarding claims 2, 3 and 11-14, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the luminescence characteristics of a device comprising an iridium complex according to Igarashi.

13. Applicant's arguments filed February 02, 2004 have been fully considered but they are not persuasive.

With respect to the added claim language regarding "via an alkyl group spacer", the examiner does not find the claim limitations explicitly disclosed in the original specification.

Even if “spacer” is interpreted as having the meaning noted by applicant in the footnote on page 23 of applicant’s response (and it is not clear that the claim language is limited to the argued meaning), the examiner does not find clear support for the claim limitations.

With respect to the issue of enablement, the examiner has reconsidered the amended claims in light of applicant’s arguments. The examiner maintains the position that it would require undue experimentation on the part of one of ordinary skill in the art at the time of the invention to make and use the invention commensurate in scope with the claims. However, the examiner will presume that each of the specific compounds disclosed on pages 26-42 of the specification, if used in a luminescence layer in combination with CBP, would be able to provide a device meeting the limitations of claim 2 and one or more of claims 11-14.

With respect to applicant’s argument that “it is not material to determine the concentration at which maximum luminescence is achieved”, claims 2 and 11-14 require determination of the concentration at which the compound of formula (1) having no substituent in A/A' or B/B' exhibits a maximum luminescence characteristic. It is not clear from the original disclosure that this concentration is necessarily less than 8 wt% for all possible comparison compounds and all possible device constructions. With respect to claim 3, the concentration of compound of formula (1) that provides a maximum luminescence characteristic must be determined in order to determine whether the claim limitations are met.

With respect to the rejection based on Igarashi’s published application, applicant’s arguments are not persuasive because Igarashi explicitly discloses phosphorescent iridium

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compounds having the presently required substituent selected from the group consisting of a) to c) as noted in the rejection set forth in this action.

With respect to the rejection based on Grushin's published application, Grushin discloses phosphorescent iridium compounds having the presently required substituent selected from the group consisting of a) to c). While the specific compounds having this substituent do not meet the limitations of a compound of formula (1) as defined in present claim 1 because they also comprise a trifluoromethyl group (which is not within the scope of a) to n) as set forth in present claim 1 but is required by present claim 9), one of ordinary skill in the art would have reasonably expected that similar compounds having a fluorine substituent in place of the trifluoromethyl group would be suitable for Grushin's purposes.

14. Miscellaneous:

Optional substituent g) as set forth in claim 1 is the same as possibility a) in the Markush group for the required substituent. Recitation of g) is duplicative.

In claim 2, "a cyclic group represented by the formula (1)" should be changed to --a compound represented by the formula (1)-- since formula (1) represents a compound rather than a cyclic group *per se*.

The examiner suggests inserting --wherein-- after "claim 1," in claims 2 and 3.

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15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

16. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for Art Unit 1774 is (703) 872-9306 for all official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
April 19, 2004



MARIE YAMNITZKY  
PRIMARY EXAMINER

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